

**CHAPTER 3**  
**AIRWORTHINESS STANDARDS**  
**NORMAL CATEGORY ROTORCRAFT**

**MISCELLANEOUS GUIDANCE (MG)**

**AC 27 MG 3. DEFINITION OF ENGINE ISOLATION FEATURES AS APPLIED TO**  
**§§ 27.79(b)(2), 27.141(b)(1), and 27.143(d)(1) (Amendment 27-19).**

a. Explanation.

(1) Each of the cited performance and flight characteristic sections of Part 27 mention multiengine rotorcraft meeting transport Category A engine isolation requirements or refer to engine isolation features which ensure continued operation of the remaining engine. Unlike normal category fixed-wing (Part 23, § 23.903(c)) and the transport category fixed-wing and rotorcraft regulations, Part 27 does not provide a general engine isolation rule to make this determination.

(2) While it is clear that Part 27 does not require complete engine isolation, if credit for this feature is claimed (i.e., sudden complete engine power failure is not considered in showing compliance with the cited section), criteria must be established to allow a satisfactory isolation assessment.

(3) An approach which the FAA/AUTHORITY would find acceptable in making a Part 27 engine isolation determination is given. The FAA/AUTHORITY logic for establishing this criteria is also presented.

b. Criteria.

(1) The engine isolation provided may be for an appropriate limited time period.

(2) The failure or malfunction of any engine or the failure of any system that can affect any engine will not--

(i) Prevent the continued safe operation of the remaining engines for the appropriate limited time period; or

(ii) Require immediate action by a crewmember for continued safe operation.

(3) Each engine must be isolated by a firewall, shroud, or equivalent means from the remaining engines.

c. Criteria Rationale.

(1) Category A Minimum Time for Isolation. The acceptance of a limited time period for engine isolation is consistent with the acceptance of a reduced level of safety for a Part 27 rotorcraft. The criteria is also consistent with the Part 27 philosophy of allowing for a controlled landing following engine failure versus the Part 29 Category A principle of continued safe flight and a controlled landing.

(2) Installation Analysis.

(i) The degree of engine isolation can be established by an installation assessment against the § 29.903(b) general isolation requirement, as modified for Part 27 by a limited time period concept.

(ii) Figure AC 27 MG 3-1 is a listing of the Part 29 sections that may be involved in Category A engine isolation considerations. Sections 29.901(c) and 29.903(b) are the general isolation regulations under which the other more specific rules naturally fall. The point that the selection of specific rules from figure AC 27 MG 3-1 does not achieve the desired degree of transport Category A engine isolation, and that the general isolation rules (§§ 29.901(c) and 29.903(b)) must be used, is illustrated by the following examples.

(A) Example #1. No specific requirement from Part 29 (or figure AC 27 MG 3-1) can be cited which precludes a common engine mount. The design of the mount could be such that its failure results in sudden, complete power loss from all engines.

(B) Example #2. No specific Part 29 requirement prohibits a common engine induction system. F.O.D., fire in the induction system, or the adverse affect of engine surge on the remaining engine could result in sudden, complete power loss from all engines.

(C) Example #3. Crosstalk between engine fuel controls (possibly used for power matching) or the use of a common input parameter signal to the fuel controls is not prohibited by any specific isolation rule. Signals could be received which command the simultaneous shutdown of all engines.

(iii) These examples clearly illustrate that specific Part 29 isolation rules cannot be selected to establish appropriate Part 27 engine isolation, and that the installation must be evaluated by the general isolation policy set forth. This can be readily accomplished by a failure mode and effects analysis (FMEA).

(3) Firewalls.

(i) CAR 6.483, prior to Amendment 6-4, effective May 15, 1953, requires "All engines, auxiliary power units, fuel burning heaters, and other combustion equipment which are intended for operation in flight shall be isolated from the remainder

of the rotorcraft by means of firewalls, shrouds, or other equivalent means.” This rule would clearly require a firewall between engines of multiengine rotorcraft.

(ii) Amendment 6-4 revised § 6.483 to read “Engines shall be isolated from personnel compartments by means of firewalls, shrouds, or other equivalent means. They shall be similarly isolated from the structure, controls, rotor mechanism, and other parts essential to a controlled landing of the rotorcraft . . .” (remainder essentially identical to current § 27.1191).

(iii) The preamble explanation of Amendment 6-4 states that these changes are “intended to afford greater protection to the crew and passengers in the event of fire during flight.” This revision did not intend to authorize less firewall isolation between the engines than was required by the earlier version. Also, the subsequent paragraphs clearly require firewalls between other combustion equipment and the rest of the rotorcraft (§ 27.1191(b)). To accept anything less for the engine is clearly inappropriate. Further, § 23.1191 requires firewalls or equivalent means between each engine and the rest of the airplane, and current safety requirements pertaining to in-flight fires should be no less stringent for normal category rotorcraft.

(iv) The lack of a firewall between engines or any other design arrangements which, in the event of one engine failure creates definable jeopardy for the remaining engines, will result in a significantly lower level of safety than is being assumed by the operators.

(v) A regulation change to clarify this § 27.1191 rule is planned.

d. Guidance.

(1) The minimum appropriate limited time period of engine isolation which would allow establishment of a one-engine-inoperative HV diagram, § 27.79(b)(2), would be defined by the time increment to recognize the engine failure and to make a landing from the most critical point on the desired HV diagram.

(2) The minimum appropriate limited time period of engine isolation to show compliance with §§ 27.141(b)(1) and 27.143(d)(1) considering the sudden power failure of one engine (rather than sudden complete power failure) would be the time increment to recognize the engine failure and to transition to a flight condition where failure of the remaining engine can be tolerated.

(3) Some existing provisions of Part 27 require isolation of certain systems (oil, fuel, and engine controls) without regard to a limited time period. These existing Part 27 engine isolation provisions must be observed regardless of the policy discussed herein.

(4) The limited time period concept must not be utilized to eliminate protection otherwise required by specific rules of Part 27 or to reduce accepted test conditions. For example, lines which carry flammable fluids in areas subject to engine fire

conditions must be fire resistant (§ 27.1183(a)). Fire resistant hose standards require testing for at least 5 minutes at 2000° F.

(5) A failure mode and effects analysis (FMEA) should establish that the failure or malfunction of any engine or the failure of any system that can affect any engine will not--

(i) Prevent the continued safe operation of the remaining engines for the appropriate limited time period.

(ii) Require immediate action by a crewmember for continued safe operation.

(6) As cited earlier, by example, selection of specific engine isolation rules from Part 29 is not effective in assuring that a sudden, complete engine power loss does not occur.

(7) Under the limited time period concept, failure of the second engine must be considered upon expiration of the limited time period. The Rotorcraft Flight Manual must provide the appropriate operating limitations, pilot operating procedures, and performance information limitations to assure continued safe operation following failure of the second engine.

FIGURE AC 27 MG 3-1  
Part 29 Engine Isolation Rules

§ 29.861(a)

§ 29.901(c)

§ 29.903(b) and (c) and (e)

§ 29.908(a)

§ 29.917(b) and (c)(1)

§ 29.927(c)(1)

§ 29.953(a)

§ 29.1027(a)

§ 29.1045

§ 29.1047(a)

§ 29.1181(a)

§ 29.1189(c)

§ 29.1191(a)(1)

§ 29.1193(e)

§ 29.1195(a) and (d)

§ 29.1197

§ 29.1199

§ 29.1201

§ 29.1305(a)(6) and (b)

§ 29.1309(b)(2)(i) and (d)

§ 29.1331(b)